IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re U.S. Patent Application of:
Shaun T. Mesher and David L. Edwards
Examiner: METZMAIER, Daniel S.
U.S. Application No.: 10/773, 176
Filing Date: February 9, 2004
Confirmation No.: 6755
Art Unit: 1762
For: MUTUAL SOLVENT FOR IMPROVED OIL AND GAS PERMEABILITY

APPEAL BRIEF FILED UNDER 37 CFR 41.37

M.S. Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
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TO THE COMMISSIONER FOR PATENTS:

This Appeal Brief is filed in support of the Notice of Appeal filed July 1, 2011, appealing the Examiner's final rejection dated April 1, 2011, of pending Claims 1, 10, 14, 16-17, 30-41, 43, and 45-47.

INDEX

(i). REAL PARTY IN INTEREST

The Assignee, SynOil Fluids Inc., is the real party in interest, by way of an assignment recorded on February 9, 2004.

(ii). RELATED APPEALS AND INTERFERENCES

None.

(iii). STATUS OF CLAIMS

Claims 2-9, 11-13, 15, 18-29, 42, and 44 have been cancelled. Claims 1, 10, 14, 16-17, 30-41, 43, and 45-47 have been finally rejected, and it is these rejections that are being appealed.

(iv). STATUS OF AMENDMENTS

No amendments to the application have been filed subsequent to the final rejection of April 1, 2011 (hereinafter the "Final Action").

(v). SUMMARY OF CLAIMED SUBJECT MATTER

Of the claims at issue, claims 1 and 14 independent claims. Claims 38 and 43 depend directly from claim 1. Claim 1 and 14 are directed toward a mutual solvent system, and a solvent system, respectively, for use in acidizing and cleaning up an oil or gas well. In the summary below, the paragraph numbers refer to the numbers in the application as filed.

As set out in claim 1, the mutual solvent system consists essentially of water soluble and water and oil soluble components, and comprises an alcohol that is water soluble present in the amount of at least 5% by weight of the mutual solvent system, an ester that is water and oil soluble present in the amount of at least 5% by weight of the mutual solvent system, an aqueous acid comprising water and acid, the aqueous acid being present in an amount at least 5% by weight of the mutual solvent system; and a solvent that comprises a ketone that is water and oil soluble (para. 7).

As set out in claim 14, the solvent system comprises an alcohol that is water soluble present in the amount of at least 5% by weight of the solvent system, an ester that is water and oil soluble present in the amount of at least 5% by weight of the solvent system, an aqueous acid comprising water and acid, the aqueous acid being present in an amount at least 5% by weight of the solvent system, and a solvent that comprises a ketone that is water and oil soluble and a cyclic ether that is water and oil soluble (paras. 7-9).

The mutual solvent system as set out in claim 38 is dependent on claim 1 and clarifies that the amount of the alcohol present is between 5% and 50% by weight of the mutual solvent system, the amount of the ester present is also between 5% and 50% by weight, and the amount of the ketone present is between 10% and 50% by weight (paras. 7, 8, 10).

The mutual solvent system as set out in claim 43 is dependent on claim 1 and clarifies

that the system consists essentially of the alcohol, the ester, the aqueous acid, and the solvent (para. 7).

(vi). GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1, 10, 30-41, 43, and 45 currently stand rejected under 35 U.S.C. 112, second paragraph.

Claims 1, 10, 14, 16-17, 30-41, 43, and 45-47 currently stand rejected under 35 U.S.C. 103(a) as being unpatentable over Watkins (US patent no. 4,737, 296) in view of Munoz (US patent publication no. 2003/0078180) and Jennings (US patent no. 4,807,703).

Claims 1, 10, 30-41, and 43 currently stand rejected under 35 U.S.C. 103(a) as being unpatentable over Slusser 1 (US patent no. 3,915,233) in view of Slusser 2 (US patent no. 3,131,759).

In view of these rejections, the issues presented for review on appeal are as follows:

Issue 1: Whether Claims 1, 10, 30-41, 43, and 45 comply with 35 U.S.C. 112, second paragraph.

Issue 2: Whether Claims 1, 10, 14, 16-17, 30-41, 43, and 45-47 are patentable over Watkins in view of Munoz and Jennings.

Issue 3: Whether Claims 1, 10, 30-41, and 43 are patentable over Slusser 1 in view of Slusser 2.

(vii). ARGUMENT

This is an appeal to the Board of Patent Appeals and Interferences from the Final Action. In the Final Action, the examiner rejected claims 1, 10, 14, 16-17, 30-41, 43, and 45-47.

1. Claims 1, 10, 30-41, 43, and 45 comply with 35 U.S.C. 112, second paragraph

35 U.S.C. 112, second paragraph, reads as follows: "The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention."

Applicant's claim 1 can be simplified in logic terms as requiring a mutual solvent system consisting essentially of X and Y components, the mutual solvent system comprising an alcohol (X component), an ester (Y component), an aqueous acid (X component), and a solvent (Y component). Applicant submits that a skilled worker would understand that the word "comprising" means that the mutual solvent system can include other components not listed. However, the skilled worker would also understand that the phrase "consisting essentially of" means that additional components are limited to X and Y components only. Thus, Applicant's claim 1 particularly points out and distinctly claims the subject matter which Applicant regards as his invention, and the examiner's objection that the phrase "consisting essentially of" can't be followed by the word "comprising" is illogical.

Thus, Applicant's claim 1, and hence all claims dependent on claim 1 are definite.

Moreover, a skilled worker would understand that "the solvent" in claim 43 is a specific claim term that has clear antecedent basis from claim 1 where the "solvent" is introduced as "compris[ing] a ketone that is water and oil soluble". Because the solvent is distinct from the alcohol, ester, and aqueous acid, it is irrelevant whether or not the alcohol, ester, and aqueous

acid may function as solvents. Thus, Applicant submits that claim 43 particularly points out and distinctly claims the subject matter which Applicant regards as his invention.

2. Claims 1, 10, 14, 16-17, 30-41, 43, and 45-47 are patentable over Watkins in view of Munoz and Jennings

Under 35 U.S.C. 103(a), a rejection of the claims generally must meet four key elements as set out by the Supreme Court in *Graham v. John Deere*, 383 U.S. 1, 148 USPQ 459 (1966), and summarized in the *Manual of Patent Examining Procedure (MPEP) Edition 8 (E8), August, 2001, Latest Revision July 2010*, s. 2141. These elements are as follows:

(A) Determining the scope and contents of the prior art;

(B) Ascertaining the differences between the prior art and the claims in issue;

(C) Resolving the level of ordinary skill in the pertinent art; and

(D) Evaluating evidence of secondary considerations.

Resolving the level of ordinary skill in the pertinent art

Applicant considers it logical to carry out the skill resolution inquiry before the other inquiries, which are built upon the skill resolution inquiry.

Applicant submits that the skilled worker in the art would likely be an acidizing technician. The skilled worker would not be highly educated, having at most a bachelor's degree in science, and potentially a technical training certificate in his field.

Determining the scope and contents of the prior art

Paragraph 1 of Applicant's background information section discloses that it was known

to remove undesirable borehole deposits using acid treatments. Watkins, Munoz, and Jennings disclose various foamed acid fluids for treating subterranean reservoirs for this purpose. Paragraph 1 of Applicant's background information also discloses that acid treatments were known to be used in combination with mutual solvents of oil and water for removing paraffinic and asphaltenic hydrocarbon deposits.

Watkins' foamed fluids minimally contain an acid, a gas, and a unique foaming agent (abstract), which is intended to give the foam stability even if contaminants such as hydrocarbons are dissolved in the fluid (11:35-39). Watkins optionally adds to such fluids a water immiscible organic solvent and an emulsifying agent (claim 1, abstract, 9: 1-4, 24-29), with the organic solvent being intended to dissolve oil-soluble organic materials that coat the acid-soluble materials (1: 22-24, 37-43). The organic solvent can include a hydrocarbon solvent (7:37-52), a halogenated hydrocarbon (7:53-8:1-5), a polar solvent (8:6-65) or mixtures thereof (7: 33-36). Regarding the polar solvent, Watkins states that polar solvents and mixtures thereof which can be employed include, inter alia "alcohols, ketones, ethers and esters" (8: 6-7). Despite Watkins inclusion of a polar solvent, it is clear that he intended the final organic solvent composition to be water as evidenced by the qualifier "water immiscible" and the required use of an emulsifier to mix acid and solvent. Indeed, Watkins states that "[m]ost of the above-described solvents are quite immiscible with the aqueous acid components, although certain of the more polar compounds will be at least partially soluble in the aqueous component. In order that the treating composition has a substantially uniform composition, it is necessary to add an emulsifying agent to emulsify or disperse any immiscible phases" (8:66-9:4).

Munoz, like Watkins, discloses a fluid composition that contains a unique contaminant-tolerant foaming additive and acid (abstract).The fluids may include a liquid concentrate composition that is diluted with a water miscible solvent "chosen from a long list of suitable solvents" (para 32), and including, inter alia "aliphatic alcohols, aliphatic ketones, aliphatic

esters, … and mixtures thereof (para 32).

Jennings discloses a foamed acid fracturing treatment comprising injecting a pre-flush pad of gelled and foamed acid, followed by injection of a foamed, ungelled acid treatment into the pre-flush pad to finger through the pad and unevenly etch the fracture face (Figs. 1 and 2, abstract). In order to dissolve the gelling agent and acid in the pre-flush pad, a water soluble organic solvent is used (3:9-12), for example including "alkanols having in the range of about 1 to 5 carbon atoms per molecule" (3:12-14), "ketones having in the range of about 3 to 6 carbon atoms per molecule" (3:15-16), "esters having in the range of about 2 to 6 carbon atoms per molecule" (3:28-30), "singly, or in mixtures of solvents of the same chemical class … or…different chemical classes" (3:51-55). Jennings' method provides the advantage of "acidizing a formation where the acid utilized maintains its strength while avoiding the buildup of harmful precipitates and thereby allows for greater penetration into the formation than heretofore possible" (1:40-45).

Ascertaining the differences between the prior art and the claims in issue

Regarding claim 1, neither Watkins, nor Munoz, nor Jennings disclose a

"mutual solvent system for use in acidizing and cleaning up an oil or gas well, the mutual solvent system consisting essentially of water soluble and water and oil soluble components, the mutual solvent system comprising:

an alcohol that is water soluble present in the amount of at least 5% by weight of the mutual solvent system;

an ester that is water and oil soluble present in the amount of at least 5% by weight of the mutual solvent system;

an aqueous acid comprising water and acid, the aqueous acid being present in an amount at least 5% by weight of the mutual solvent system; and

a solvent that comprises a ketone that is water and oil soluble."

Similarly, regarding claim 14, neither Watkins, nor Munoz, nor Jennings disclose a "solvent system for use in acidizing and cleaning up an oil or gas well, the solvent system comprising:

an alcohol that is water soluble present in the amount of at least 5% by weight of the solvent system;

an ester that is water and oil soluble present in the amount of at least 5% by weight of the solvent system;

an aqueous acid comprising water and acid, the aqueous acid being present in an amount at least 5% by weight of the solvent system; and

a solvent that comprises a ketone that is water and oil soluble and a cyclic ether that is water and oil soluble."

Similarly, regarding claim 38, neither Watkins, nor Munoz or Jennings disclose the "mutual solvent system of claim 1 in which:

the alcohol is present in the amount of between 5% and 50% by weight of the mutual solvent system;

the ester is present in the amount of between 5% and 50% by weight of the mutual solvent system; and

the ketone is present in the amount of between 10% and 50% by weight of the mutual solvent system."

Finally, regarding claim 43, neither Watkins, nor Munoz, nor Jennings disclose the "mutual solvent system of claim 1 in which the mutual solvent system consists essentially of the alcohol, the ester, the aqueous acid, and the solvent."

Determining whether the claimed invention is obvious over Watkins in view of Munoz and Jennings.

Applicant submits that Applicant's combination as defined by claims 1 and 14 operate on entirely different principles than, and have unexpected advantages not disclosed or suggested by, Watkins, Munoz, or Jennings. Thus, Applicant submits that it's claimed combination as defined by claims 1 and 14 is patentable over Watkins, Munoz, and Jennings.

Acid soluble deposits within the downhole environment may be covered in an organic residue that may obstruct or prevent effective acid contact with the acid solubles. In general, there were at least three known ways of overcoming this problem, as demonstrated by the references cited by the examiner. As will be shown, both methods rely on organic removal by dissolution.

The first method involves a pre-treatment of the reservoir with a mutual solvent, followed by a separate and distinct injection of acid. This method is referred to in Munoz, who mentions a need for an intermediate treatment to convert an oil-wet surface to a water-wet surface (para. 42) in cases of high organic concentrations in the borehole.

The second method is taught by Watkins, and incorporates an emulsified mixture of an aqueous acid component and a water immiscible organic solvent for dissolving the oil-soluble organic materials that coat the acid-solubles (Watkins 1: 22-24, 37-43). Because the organic materials are removed by dissolution, a skilled worker reading Watkins would have understood that an organic solvent should be chosen to afford the maximum allowable oil-solubility of the organic solvent while still being able to achieve a stable emulsion. This skilled worker would

also understand that regardless of the use of polar sub components within the organic solvent, the combined organic solvent would on the whole be immiscible with water and therefore always require emulsification to mix with the acid (9:1-4, 24-29, claim 1).

The third method is taught directly by Munoz and indirectly by Jennings, and incorporates an aqueous acid and an emulsifier, such as a foaming agent. Although the emulsifier may have "low oil solubility" (Munoz, para. 27), the emulsifier effectively acts as a soap that intentionally or unintentionally dissolves the organic residue from the acid solubles (para. 41).

In contrast with these methods, Applicant has taken the art in a new and inventive direction with Applicant's claimed combination, which does not rely on dissolution of organics. Applicant submits that its combination, which lists only water soluble and water and oil soluble components, is guaranteed to be predominantly water and acid soluble with comparatively low oil solubility. A skilled worker would understand this to be the case because all of the elements of the claimed mutual solvent system are water or have water solubility, while not every element has oil solubility. Because it has comparatively low oil-solubility, Applicant's claimed system does not substantially dissolve oil-based organic materials as Watkins compositions do. However, Applicant has discovered that its particular claimed combination removes oil-based organics by the unique mechanism of creating interfacial tension with the oil-based organics, acting to loosen and liberate the organics from the surface of acid-solubles. The liberated organics may then float to the surface of the mutual solvent system, while the aqueous acid is free to work on and dissolve the acid-soluble materials beneath. This effect was witnessed in the testing reported in paragraph 12 of Applicant's specification, where "oil separation/effervescence" , and not oil dissolution, was reported. Thus, Applicant's system is an effective acidizing system that negates the need for an emulsifier and hence is taught away from by Watkins, Munoz, and Jennings.

Applicant's claimed mutual solvent system possesses a number of advantages over prior compositions such as Watkins, Munoz, or Jennings. Firstly, the effectiveness of the claimed system is not limited by the capacity of the system to dissolve organic materials, since the system has comparatively low oil solubility. Thus, the effectiveness of a given volume of fluid is not directly proportional to the relative amount of organic material downhole. Secondly, because the claimed system has only water soluble and water and oil soluble components, the claimed system has a uniform single phase composition. By logic a single phase affords faster acid transfer and effective contact with acid-solubles than does an emulsion, whose varying and suspended composition segregates acid and slows or obstructs acid transfer to acid solubles. Thus, a single phase fluid has a reduced minimum contact time required to clear acid solubles than does a comparable emulsion. Thirdly, emulsifiers are not required and in fact would be expected to reduce the functionality of Applicant's composition as an emulsifier would necessarily lead to an emulsified aqueous/ organic multi-phase mixture downhole. Emulsifiers are also disadvantageous in that they are expensive, unpredictable, environmentally hazardous, and may plate out and plug the formation. Fourthly, the increased polarity of the system allows carriage of relatively more acid in a single phase system. For example, Applicant's tests reported in paragraph 12 used HCl concentrations of 50%, whereas the maximum acid concentrations of Munoz (30%, claim 62) and Jennings (effectively 25% due to reaction with gelling agent at higher concentrations, 3:65-4:7) are considerably lower. Watkins appears to allow acid concentrations of 5-90%, but only in a multi-phase emulsion that suffers from the associated disadvantages discussed above.

The examiner impliedly admits in his rejection that Applicant's composition is new, and Applicant agrees. However, the examiner's obviousness analysis betrays a lack of appreciation for the unexpectedness of the above-described advantages, as summarily stated on page 6 of the Final Action: "Applicants' characterization that the single test shows unexpected results for the scope of the claims is not deemed persuasive." Applicant cites MPEP at 716.02(a)(I), which

states that:

> "'A greater than expected result is an evidentiary factor pertinent to the legal conclusion of obviousness ... of the claims at issue.' In re Corkill, 711 F.2d 1496, 226 USPQ 1005 (Fed. Cir. 1985). In Corkhill, the claimed combination showed an additive result when a diminished result would have been expected."

Applicant submits that a skilled worker contemplating Applicant's claimed combination would not have expected Applicant's system to clear organic material at all or at the least in an economical fashion. That a skilled worker would have expected a system with comparatively low oil solubility to be ineffective in clearing organics is evidenced by Watkins requirement of a "water immiscible solvent" (claim 1) for this purpose, and Munoz and Jennings' use of a water soluble organic solvent for the sole purpose of co-dissolving acid with foaming agent (Munoz para. 31) or gel (Jennings 3:9-12) and not for removing organics. Thus, a skilled worker would have expected a diminished result and would have been surprised to discover the above-described advantages, which thus represent a patentable departure from the art.

Thus, Applicant submits that claims 1 and 14, and hence all claims dependent on claims 1 and 14, are patentable over Watkins, Munoz, and Jennings.

Examiner's objections and Applicant's reply

The examiner's essential argument against patentability can be found on page 4 of the Final Action, where the examiner states that:

> "It is generally prima facie obvious to use in combination two or more ingredients that have previously been used separately for the same purpose in order to form a third composition useful for that same purpose… the idea of combining them flows logically from their having been individually taught in the prior art. In the instant case, the ester, ether, and alcohol solvents are all taught for the same function as a mutual solvent of the oil and water. It would have been obvious to

> one of ordinary skilled in the art at the time of applicants' invention to employ the mixtures in an acid containing composition for the advantage of matching the solvent system to the system, e.g., sludge and scale, being treated."

Applicant submits that the examiner erred in his conclusion of obviousness based on a mischaracterization of the purpose of the organic solvent in each of Watkins, Munoz, and Jennings. Watkins purpose is to dissolve organic material, hence Watkins requirement of water immiscibility. For Munoz and Jennings, the purpose of the organic solvent appears to be to co-dissolve acid with foaming agent (Munoz para. 31) or gel (Jennings 3:9-12), as explained above. By contrast, the purpose of Applicant's claimed combination is merely to loosen organic material covering acid soluble deposits, and explicitly not to dissolve organic material, foaming agent or emulsifier. There is no overlap in purpose, and in fact the purpose of organic solvent in each of Watkins, Munoz, and Jennings teaches away from Applicant's claimed system. For Watkins, a skilled worker would be taught away from Applicant's combination because Applicant's combination would not be water immiscible and would not substantially dissolve organics. For Munoz and Jennings, a skilled worker would be taught away from using an organic solvent at all, because Applicant's claimed system requires no foaming or gelling agent to co-dissolve with acid. Thus, the idea of extrapolating Applicant's claimed combination from one or more of Watkins, Munoz, and Jennings long lists of organic solvents doesn't logically flow from these references.

Finally, the examiner states on page 5 that "[t]he specification does not provide a showing of criticality of the particular solvents and each is specifically recited in the Watkins, Munoz, Jr. et al, and Jennings, Jr references." Regarding criticality/unexpected results, the MPEP states the following principles at 716.02(d):

> "'objective evidence of nonobviousness must be commensurate in scope with the claims which the evidence is offered to support.' In other words, the showing of unexpected results must be reviewed to see if the results occur over the entire claimed range. In re Clemens, 622 F.2d 1029, 1036, 206 USPQ 289, 296 (CCPA

> 1980).... The nonobviousness of a broader claimed range can be supported by evidence based on unexpected results from testing a narrower range if one of ordinary skill in the art would be able to determine a trend in the exemplified data which would allow the artisan to reasonably extend the probative value thereof. In re Kollman, 595 F.2d 48, 201 USPQ 193 (CCPA 1979)."

Applicant clarifies that there are at least two levels of criticality inferable from the test results of paragraph 12 that support patentability. The first level is that the test results demonstrate that combinations within the claim scope consistently achieve the advantages discussed above, while combinations outside the claim scope do not consistently achieve the same advantages and thus possess reduced commercial utility if any. While 15 minutes for oil separation/effervescence was arbitrarily chosen as a benchmark indicative of a suitable combination, this benchmark is for relative comparison only, and longer or shorter periods may also provide suitable compositions. The examiner complains that the test is not a "standard in the art" (page 6, Final Action), but the MPEP contains no such a requirement other than probativeness. Regardless, Applicant submits that the results are probative because they allow a skilled worker to infer commercially useful consistency over the claimed range of concentrations for each component. Applicant points out that in this regard the skilled worker would appreciate that the functional limitations on each component, i.e. "water soluble" or "water and oil soluble", sufficiently narrow the class size for each component and thus support the reasonable extrapolation of the results across the entire claimed range. In addition, the skilled worker would find the extrapolation logical when considering what range of combinations would still attain the water solubility and comparatively low oil solubility required to achieve the unexpected advantages discussed above. Thus, the test results are commensurate in scope with the claimed range, contrary to the examiner's assertion otherwise.

The second level of criticality inferable from the test results is that there may be combinations outside the scope that achieve some or all of the unexpected advantages discussed

above, by providing a combination with water solubility and comparatively low oil solubility. In this regard the examiner objects on pages 6-7 of the Final Action that "Applicants' assertion is not consistent with the data in paragraph [0012] of the published application and said data is not commensurate in scope with the independent claims. Paragraph [0012] of the published application shows the methanol/ethyl acetate [sic, methyl acetate] combination, which is outside the claimed scope but is asserted by applicants to be inventive." In response, Applicant makes two points. Firstly, logic dictates that an Applicant is free to draw its claims as narrow as it likes, provided that the claims still cover unobvious and novel content. In this regard, Applicant's selection of a claim boundary narrower than a broader class of combinations that achieve criticality should not bar Applicant from patent protection for the narrower class. In this case Applicant has chosen a narrower class for the valid reasons of a) increasing its chances of obtaining a patent, and b) a lack of certainty of which combinations outside the claimed combinations achieve the unexpected advantages discussed above. Secondly, the broader class, however it may be drawn, achieves criticality anyway, in that the test results illustrate the unexpected advantages discussed above where the skilled worker in light of Watkins, Munoz, and Jennings would expect a disadvantage.

Thus, Applicant submits that claims 1 and 14, and hence all claims dependent on claims 1 and 14, are patentable over Watkins, Munoz, and Jennings.

Additional reasons why specific claims are patentable

Claim 1 is further patentable for the additional reason that it consists "essentially of water soluble and water and oil soluble components". This limitation effectively excludes foaming applications because by definition gas used in foaming applications must be neither water soluble nor water and oil soluble in order to form the foam, which is a multiphase emulsion of liquid and gas. Thus, a skilled worker would understand that a foaming agent was not required,

and would be led away from consultation of Watkins, Munoz, nor Jennings, who all explicitly focus on foamed fluids and where different considerations apply. Thus, claim 1, and all claims dependent on claim 1, is *a fortiori* is patentable over Watkins, Munoz, and Jennings.

Claim 14 is further patentable for the inclusion of a cyclic ether to a claimed combination similar to that disclosed in claim 1. Applicant has found that addition of a cyclic ether to the combination increases the effectiveness of the resulting combination, despite the relative expensiveness of cyclic ethers. Thus, claim 14, and hence all claims dependent on claim 14, is further patentable over Watkins, Munoz, and Jennings.

Applicant further submits that claim 43, which excludes components beyond the alcohol, ester, aqueous acid, and solvent, is patentable for the reasons given above and the fact that this claim indirectly excludes the possibility of an emulsifier or foaming agent. Thus, claim 43 is patentable over Watkins, Munoz, and Jennings.

In addition, Applicant further states that claim 38, which narrows the concentration range of components in claim 1, is also patentable for the additional reason that claim 38 requires at least 20% combined concentration of the alcohol, ester, and ketone. Applicant has found that on the whole such combined concentrations over 20% operate more effectively than combined concentrations below 20%, and thus claim 38, and all claims dependent on claim 38, are further patentable over Watkins, Munoz, and Jennings.

3. Claims 1, 10, 30-41, and 43 are patentable over Slusser 1 in view of Slusser 2

Slusser 2 doesn't appear to inject aqueous acid at all and is irrelevant. Slusser 1 supplies acid and mutual solvent in separate and distinct injections (abstract) and thus cannot teach Applicant's claimed combination. Thus, Applicant's claims 1 and 14, and hence all claims

dependent on claims 1 and 14, are patentable over Slusser 1 and Slusser 2.

4. CONCLUSION

In light of the above arguments, Applicant submits that Claims 1, 10, 14, 16-17, 30-41, 43, and 45-47 are patentable over one or more of Watkins, Munoz, Jennings, Slusser 1, and Slusser 2. Accordingly, Applicant submits that the Final Action has failed to present a *prima facie* case of obviousness that supports a rejection of these claims. The Board should direct that the 35 U.S.C. § 103(a) rejection of Claims 1, 10, 14, 16-17, 30-41, 43, and 45-47 be withdrawn and the claims allowed.

December 8, 2011
Respectfully submitted.

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(vii). CLAIM APPENDIX

1. A mutual solvent system for use in acidizing and cleaning up an oil or gas well, the mutual solvent system consisting essentially of water soluble and water and oil soluble components, the mutual solvent system comprising:

an alcohol that is water soluble present in the amount of at least 5% by weight of the mutual solvent system;

an ester that is water and oil soluble present in the amount of at least 5% by weight of the mutual solvent system;

an aqueous acid comprising water and acid, the aqueous acid being present in an amount at least 5% by weight of the mutual solvent system; and

a solvent that comprises a ketone that is water and oil soluble.

2-9. Cancelled.

10. The mutual solvent system of claim 1 in which the ester is a $C_2 - C_{10}$ ester.

11-13. Cancelled.

14. A solvent system for use in acidizing and cleaning up an oil or gas well, the solvent

system comprising:

an alcohol that is water soluble present in the amount of at least 5% by weight of the solvent system;

an ester that is water and oil soluble present in the amount of at least 5% by weight of the solvent system;

an aqueous acid comprising water and acid, the aqueous acid being present in an amount at least 5% by weight of the solvent system; and

a solvent that comprises a ketone that is water and oil soluble and a cyclic ether that is water and oil soluble.

15. (Cancelled)

16. The solvent system of claim 14 in which the aqueous acid is present in the amount of between 10% and 50% by weight of the solvent system.

17. The solvent system of claim 16 in which the acid is hydrochloric acid.

18-29. Cancelled.

30. The mutual solvent system of claim 1 in which the solvent further comprises a cyclic

ether that is water and oil soluble.

31. The mutual solvent system of claim 1 in which the ketone comprises a $C_3 - C_{10}$ ketone.

32. The mutual solvent system of claim 31 in which the ketone comprises methyl ethyl ketone.

33. The mutual solvent system of claim 32 in which the methyl ethyl ketone is present in the amount of between 10% and 50% by weight of the mutual solvent system.

34. The mutual solvent system of claim 1 in which the ketone is present in the amount of between 10% and 50% by weight of the mutual solvent system.

35. The mutual solvent system of claim 1 in which the aqueous acid is present in the amount of between 10% and 50% by weight of the mutual solvent system.

36. The mutual solvent system of claim 1 in which the acid is hydrochloric acid.

37. The mutual solvent system of claim 30 in which the cyclic ether comprises tetrahydrofuran.

38. The mutual solvent system of claim 1 in which:

the alcohol is present in the amount of between 5% and 50% by weight of the mutual solvent system;

the ester is present in the amount of between 5% and 50% by weight of the mutual solvent system; and

the ketone is present in the amount of between 10% and 50% by weight of the mutual solvent system.

39. The mutual solvent system of claim 38 in which:

the alcohol comprises methanol present in the amount of about 12.5% by weight of the mutual solvent system;

the ester comprises methyl acetate present in the amount of about 12.5% by weight of the mutual solvent system;

the aqueous acid comprises 15% hydrochloric acid and is present in the amount of about 50% by weight of the mutual solvent system;

the ketone comprises methyl ethyl ketone present in the amount of about 25% by weight of the mutual solvent system.

40. The mutual solvent system of claim 38 in which:

the alcohol comprises methanol present in the amount of about 8.25% by weight of the mutual solvent system;

the ester comprises methyl acetate present in the amount of about 16.75% by weight of the mutual solvent system;

the aqueous acid comprises 15% hydrochloric acid and is present in the amount of about 50% by weight of the mutual solvent system;

the ketone comprises methyl ethyl ketone present in the amount of about 25% by weight of the mutual solvent system.

41. The mutual solvent system of claim 38 in which the alcohol comprises methanol, the ester comprises methyl acetate, the acid comprises hydrochloric acid and the ketone comprises methyl ethyl ketone.

42. (Canceled.)

43. The mutual solvent system of claim 1 in which the mutual solvent system consists essentially of the alcohol, the ester, the aqueous acid, and the solvent.

44. (Canceled.)

45. The mutual solvent system of claim 37 in which the tetrahydrofuran is present in the amount of between 5% and 50% by weight of the mutual solvent system.

46. The mutual solvent system of claim 14 in which the cyclic ether comprises tetrahydrofuran.

47. The mutual solvent system of claim 46 in which the tetrahydrofuran is present in the amount of between 5% and 50% by weight of the solvent system

(ix). EVIDENCE APPENDIX

None.

(x). RELATED PROCEEDINGS APPENDIX

None.